Surface Water Management Strategies in the 2011 South Central Texas Regional Water Plan

GSA BBASC Meeting

March 15, 2011

Five WMS Evaluated in the Plan

- GBRA Mid-Basin (SW)
- GBRA New Appropriation (Lower Basin)
- GBRA Lower Basin Storage
- Storage Above Canyon Reservoir
- CRWA Siesta Project

GBRA Mid-Basin (Surface Water)

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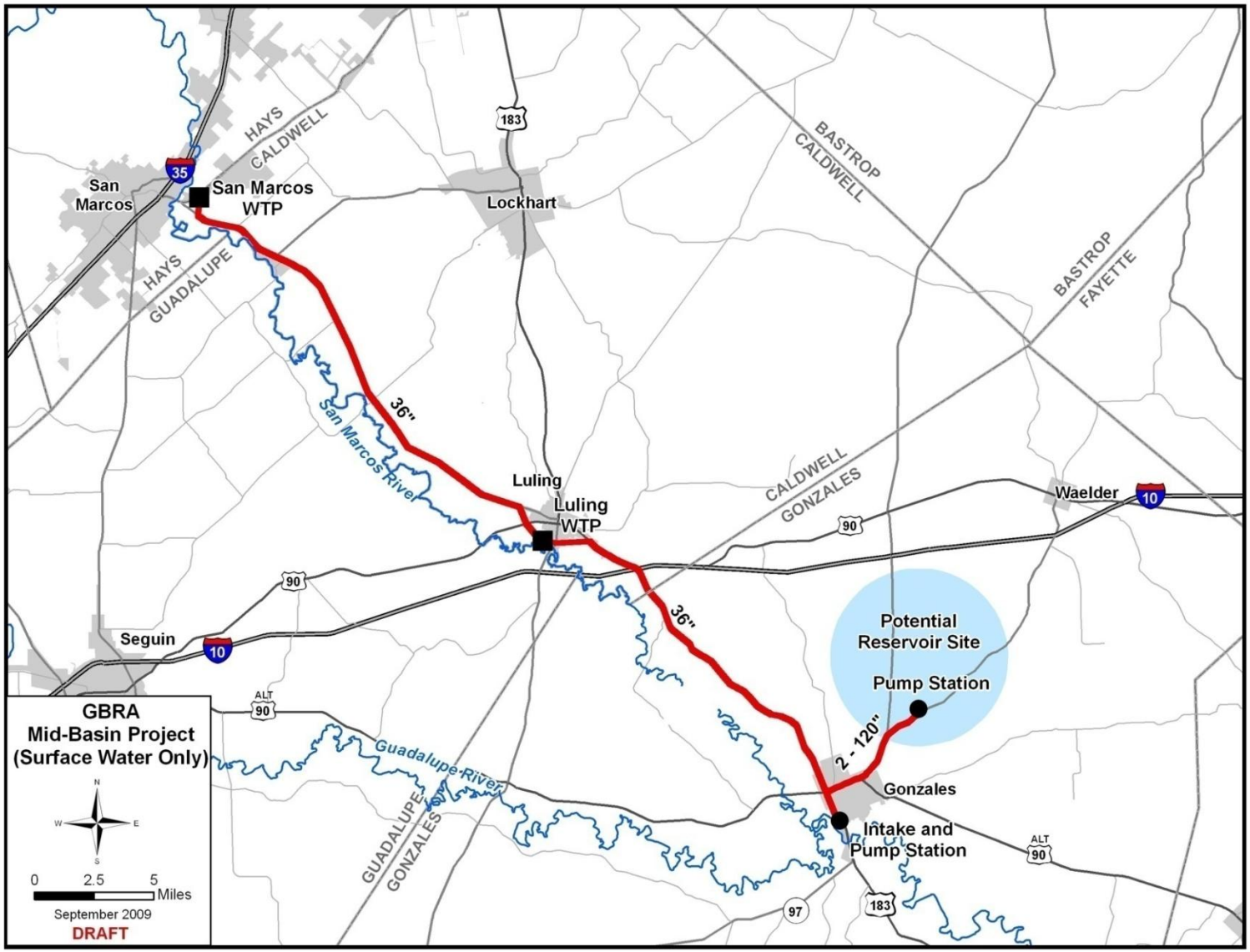
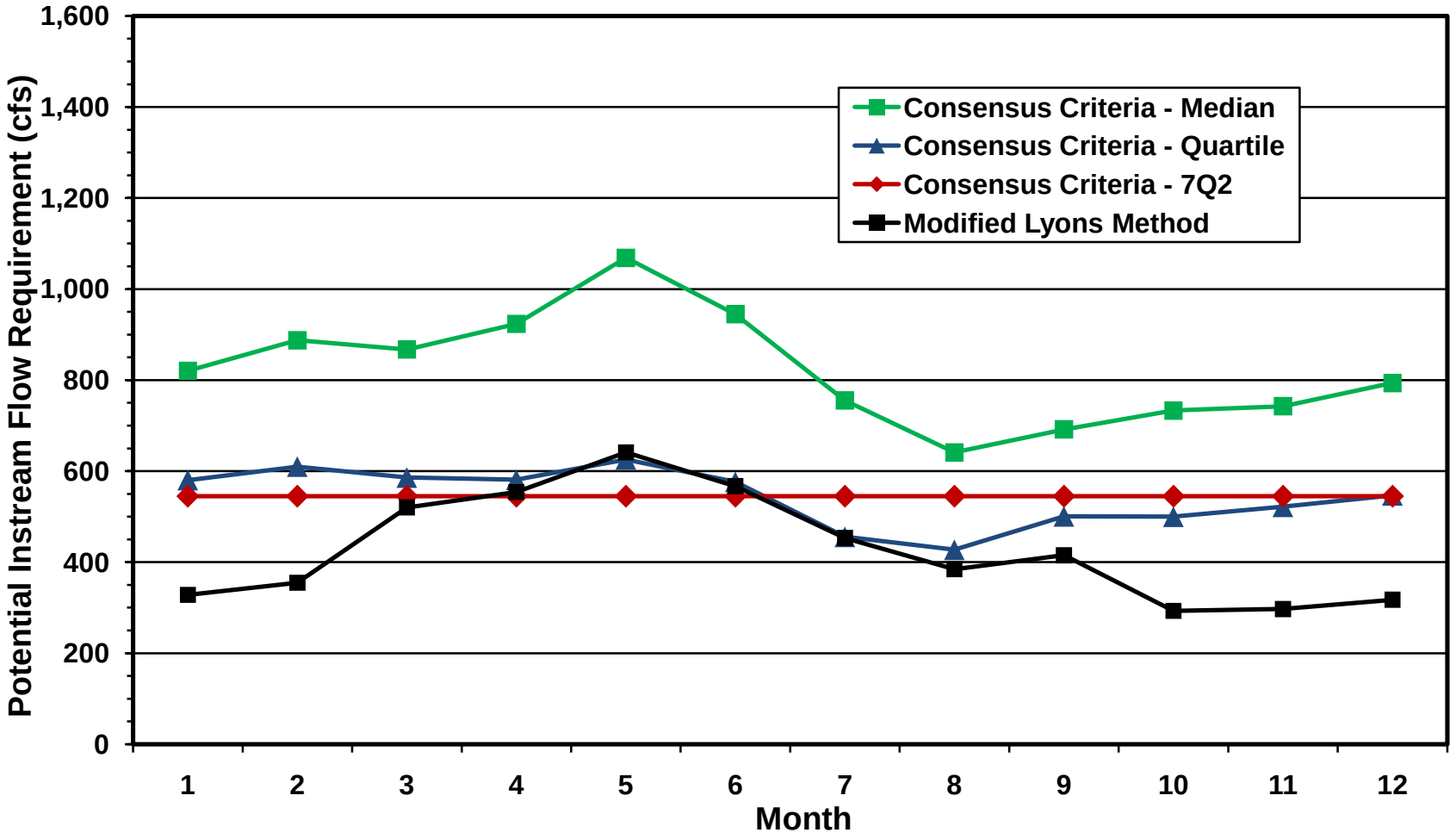


GBRA Mid-Basin (Surface Water)

- Supply:
  - Potential Customers include WUGs in Caldwell and Hays Counties
  - Sources include Guadalupe River Diversions and Stored Water in Gonzales County
  - 25,000 acft/yr (22.3 MGD) Uniform Delivery
    - 21,000 acft/yr delivered to San Marcos WTP
    - 4,000 acft/yr delivered to Luling WTP
    - Firm yield is subject to the Instream Flows Process
  - 2 Scenarios for Surface Water Availability
    - Region L: Surface water available constrained by the Consensus Criteria for Environmental Flows Needs (CCEFN) and includes treated effluent.
    - Permitting: Surface water available constrained by Modified Lyons Method (Lyons) and does not include treated effluent.
  - Project subject to senior water rights, full application of environmental flow standards adopted pursuant to Section 11.1471 of the Texas Water Code, and the TCEQ permitting process.

Instream Flow Requirements



GBRA Mid-Basin (Surface Water)

Region L (CCEFN)

- Facilities:
  - Off-Channel Reservoir (188,800 acft)
  - 517 MGD intake
  - 2 Pump Stations and 1 Booster Station
  - Transmission Pipelines:
    - 2 - 120-inch, 7 miles each
    - 36-inch, 44 miles
  - Water Treatment Plant expansions and enhancements at Luling and San Marcos
- Cost:
  - Capital Facilities = $345,899,000
  - Total Project Cost = $546,941,000
  - Annual Cost = $55,097,000/yr
  - Unit Cost = $2,204/acft/yr

Permitting (Lyons)

- Facilities:
  - Off-Channel Reservoir (105,500 acft)
  - 323 MGD intake
  - 2 Pump Stations and 1 Booster Station
  - Transmission Pipeline:
    - 2 - 96-inch, 7 miles each
    - 36-inch, 44 miles
  - Water Treatment Plant expansions and enhancements at Luling and San Marcos
- Cost:
  - Capital Facilities = $294,210,000
  - Total Project Cost = $457,611,000
  - Annual Cost = $46,985,000/yr
  - Unit Cost = $1,879/acft/yr

GBRA New Appropriation (Lower Basin)

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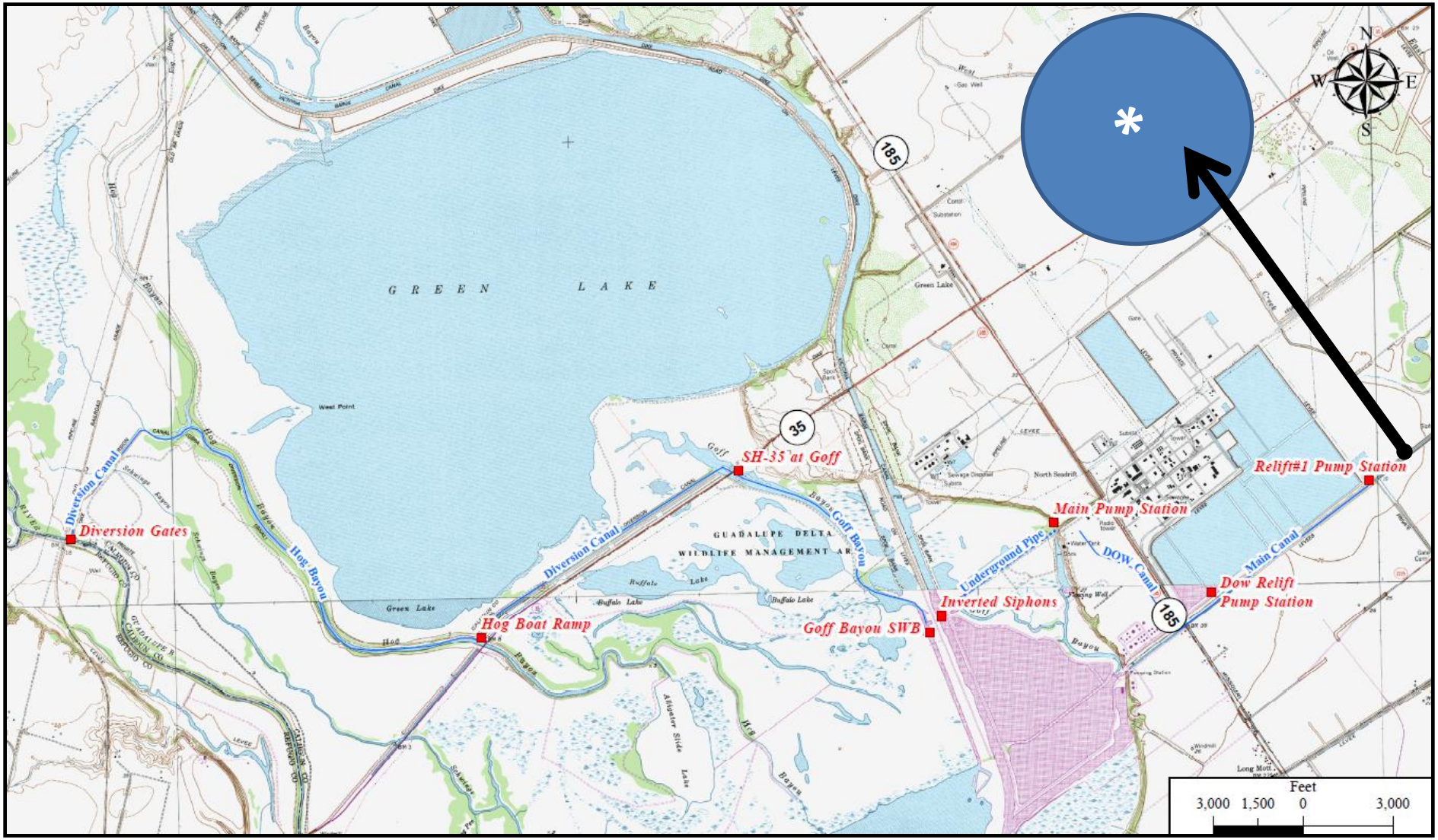


Location to be determined and size based on 25,000 acft at 25-foot depth

GBRA New Appropriation (Lower Basin)

- Source and Supply:
  - Up to 189,484 acft/yr of New Diversion from Guadalupe River via Calhoun County Canal System, Maximum Diversion Rate of up to 500 cfs
  - Off-Channel Storage of 100,000 acft (Assumed 25-foot depth)
  - Diversions subject to Consensus Criteria for Environmental Flow Needs, all existing water rights, and Mid-Basin Application
  - Firm Yield of ~11,300 acft/yr Municipal/Industrial Delivery

- Facilities:
  - Main Pump Station and Canal Upgrades
  - New Intake and Pump Station from Main Canal (~250 cfs)
  - 10-mile, 96-inch diameter Diversion Pipeline
  - Off-Channel Storage of 100,000 acft
  - Integration

GBRA New Appropriation (Lower Basin)

Off-Channel Reservoir Size	100,000 acft
Firm Yield (acft/yr)	11,300
Capital Facilities Cost ($)	$160,021,000
Total Project Cost ($)	$246,849,000
Annual Cost ($/yr)	$21,585,000
Unit Cost ($/acft/yr)	$1,910

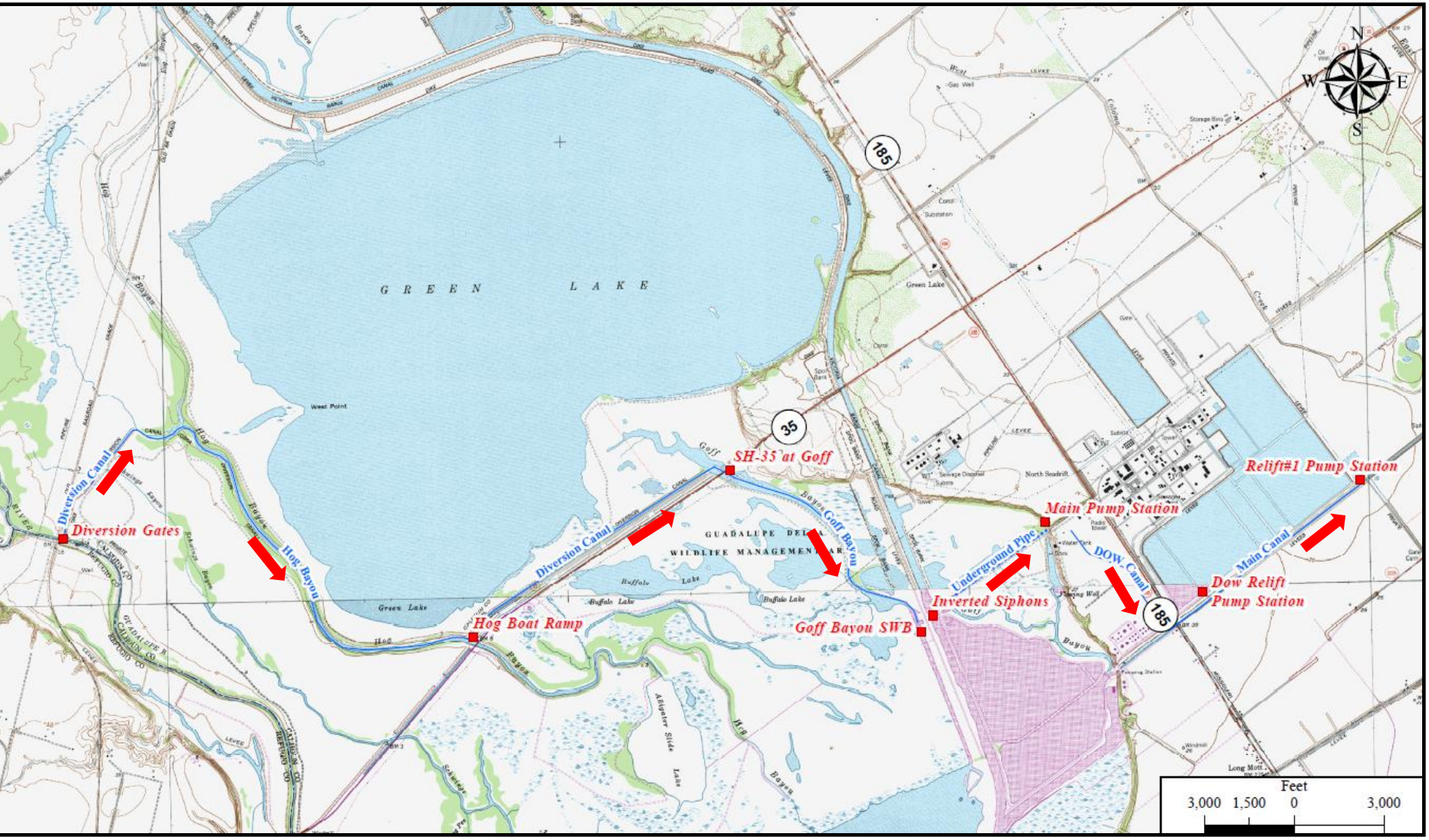
Note: Costs are based on Raw Water at the Reservoir(s) + Integration

GBRA Lower Basin Storage

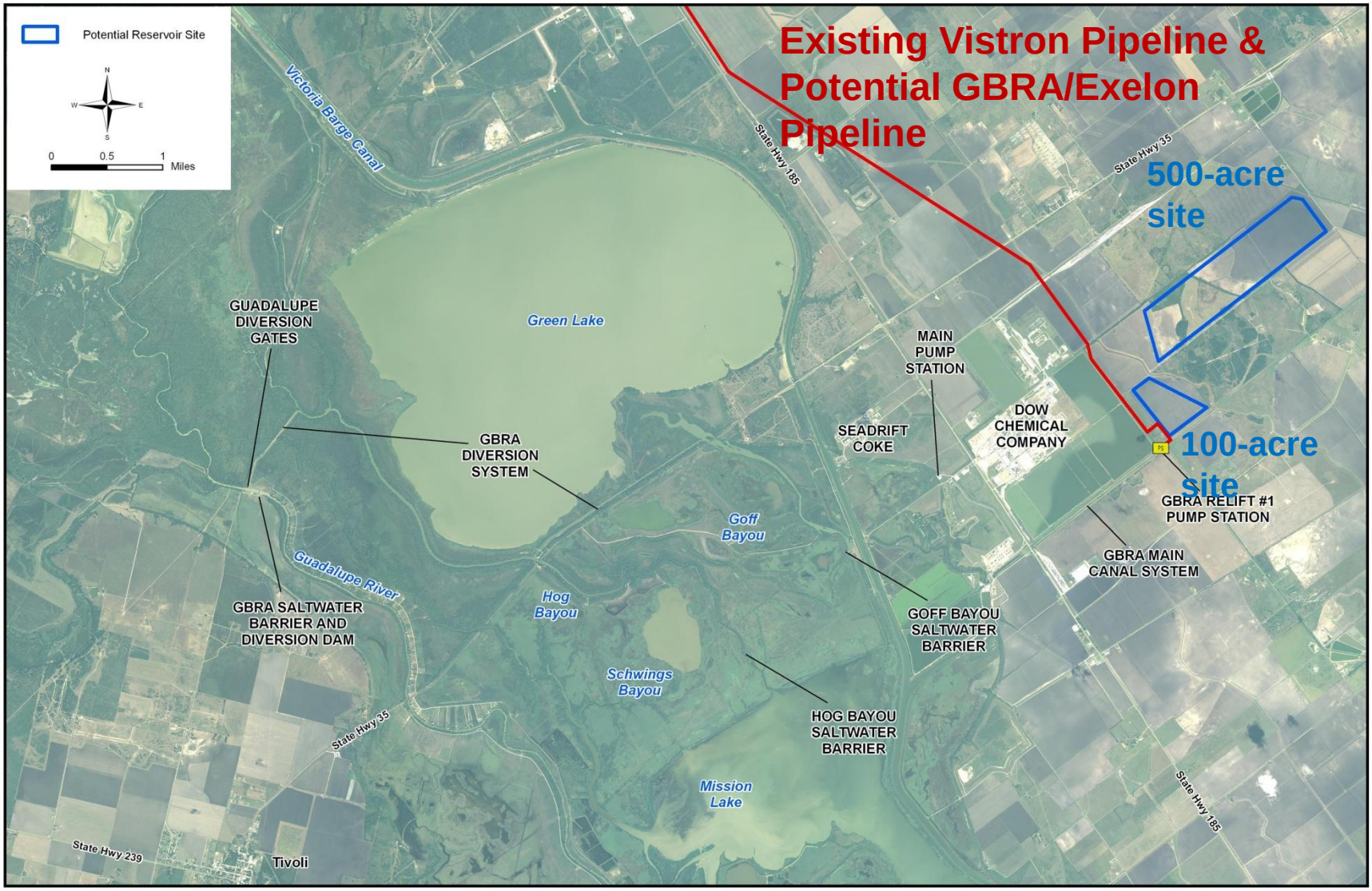
GBRA Lower Basin Storage

- Source and Supply:
  - Existing Interruptible GBRA/Dow Lower Basin Water Rights to be Made Firm with Off-Channel Storage
  - Diversions Subject to Senior Water Rights
  - Proposed Off-Channel Reservoir Size of 2,500 acft (100 acre site)
  - Maximum Diversion Rate of 50 cfs into Off-Channel Reservoir
  - Firm Yield of ~26,400 acft/yr with 100 acre site and Allocation of ~28,900 acft/yr of Interruptible Water Rights
- Facilities:
  - Dam & Spillway
  - Pump Station on Main Canal (50 cfs)
  - Inlet & Outlet Pipelines & Structures

GBRA Lower Basin Storage
Calhoun Canal System



GBRA Lower Basin Storage Sites



GBRA Lower Basin Storage

Off-Channel Reservoir Size	2,500 acft
Firm Yield (acft/yr)	28,369
Capital Facilities Cost ($)	$23,187,000
Total Project Cost ($)	$33,800,000
Annual Cost ($/yr)	$2,962,700
Unit Cost ($/acft/yr)	$104

Note: Costs are based on Raw Water delivered to the GBRA Main Canal.

Storage Above Canyon – ASR

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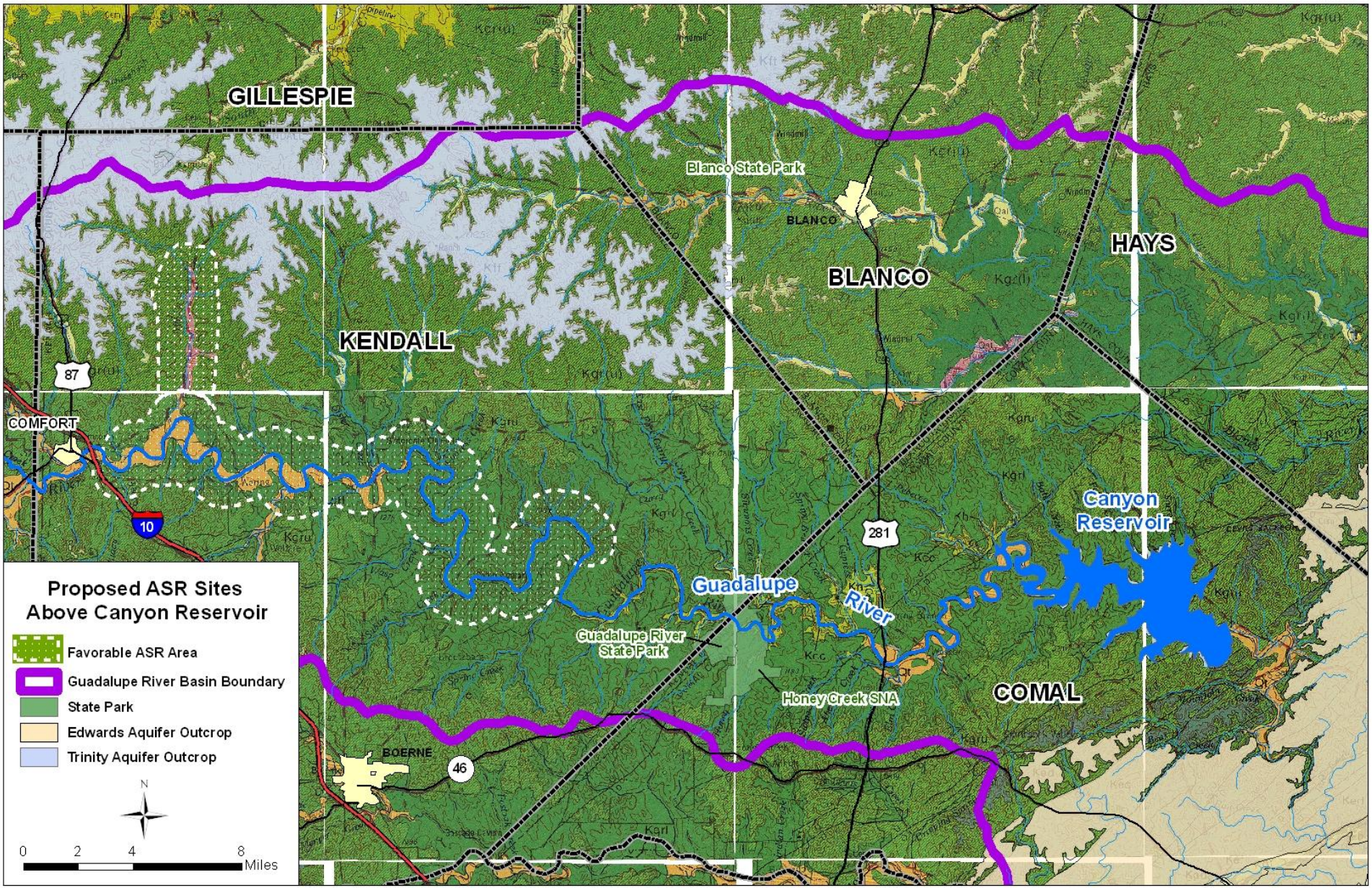


Storage Above Canyon – ASR

- Aquifer Storage and Recovery (ASR) sites above Canyon Reservoir identified.
- Potential Customers include entities in Comal and Kendall Counties.

Groundwater Storage Summary:

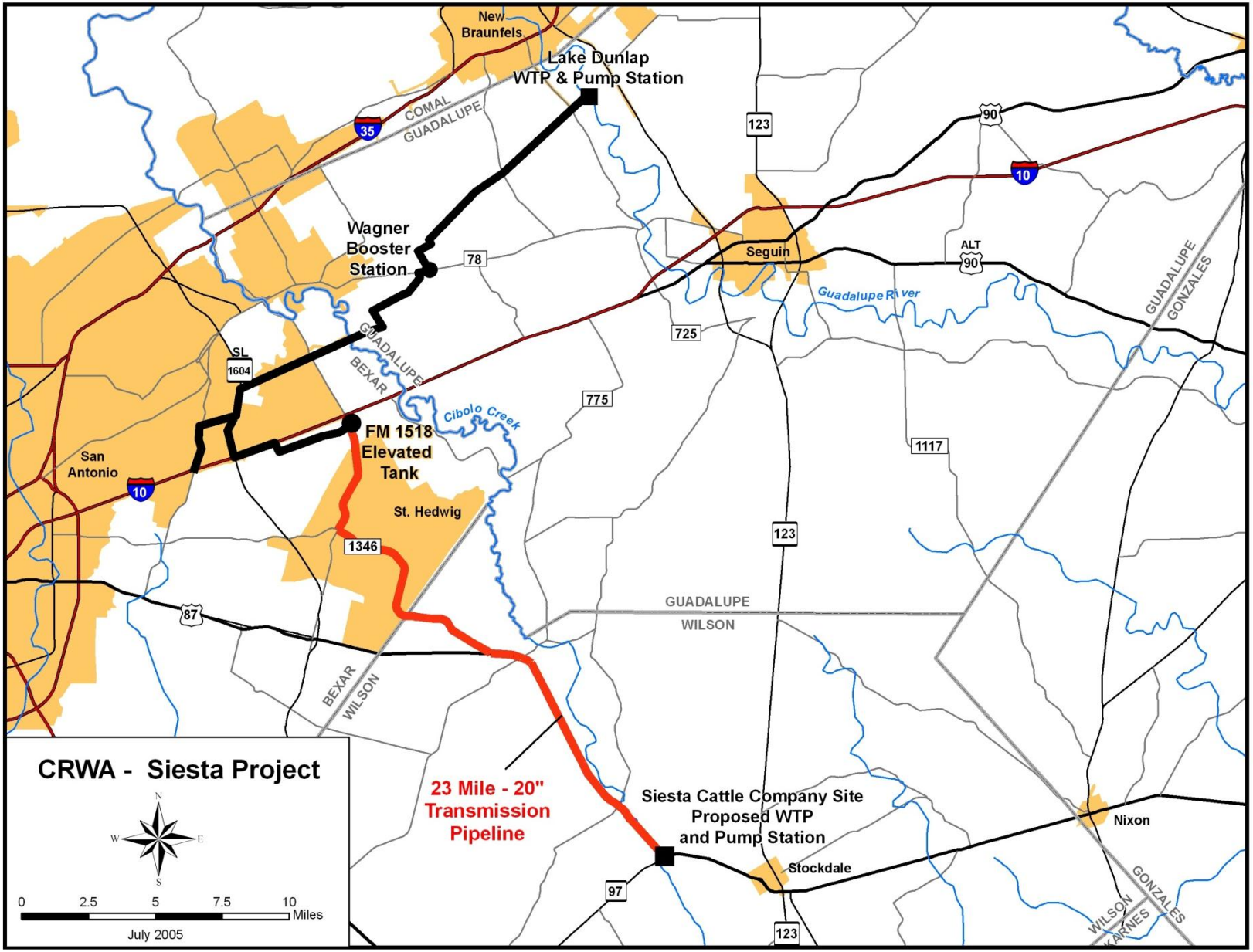
- Using ASR to firm-up interruptible run-of-river water available under new appropriation to meet demands in Kendall and/or Comal Counties.
  - 10,000 acft assumed storage capacity in Trinity Aquifer in immediate area
  - 3,140 acft/yr of firm supply

- Facilities include:
  - Intake(s) and Pump Station(s) at Guadalupe River
  - Transmission Pipeline
  - Treatment Plant
  - 10 ASR Wells (350 gpm/each)

- Cost Estimates (Treated Water at ASR Field):
  - Capital Facilities = $26,297,000
  - Total Project Cost = $37,326,000
  - Annual Cost = $5,020,000/yr
  - Unit Cost = $1,599/acft/yr

CRWA Siesta Project

CRWA Siesta Project



CRWA Siesta Project

- Source and Supply:
  - Amendment to existing CRWA's Siesta Water Right on Cibolo Creek
  - Acquisition and consolidation of other existing water rights on Cibolo Creek
  - Purchase of reuse make-up water from upstream WWTPs
  - Alternate backup is Brackish Wilcox GW
  - Potential Customers are Existing CRWA Members

- Facilities:
  - Intake and Pump Station on Cibolo Creek
  - 23-mile, 20-inch Diameter Transmission Pipeline
  - 1 Booster Station
  - 7 MGD WTP
  - Delivery point is FM1518 Elevated Tank
  - Sized for Peak Monthly Delivery on Municipal Pattern

CRWA Siesta Project

- Firm Yield = 5,042 acft/yr

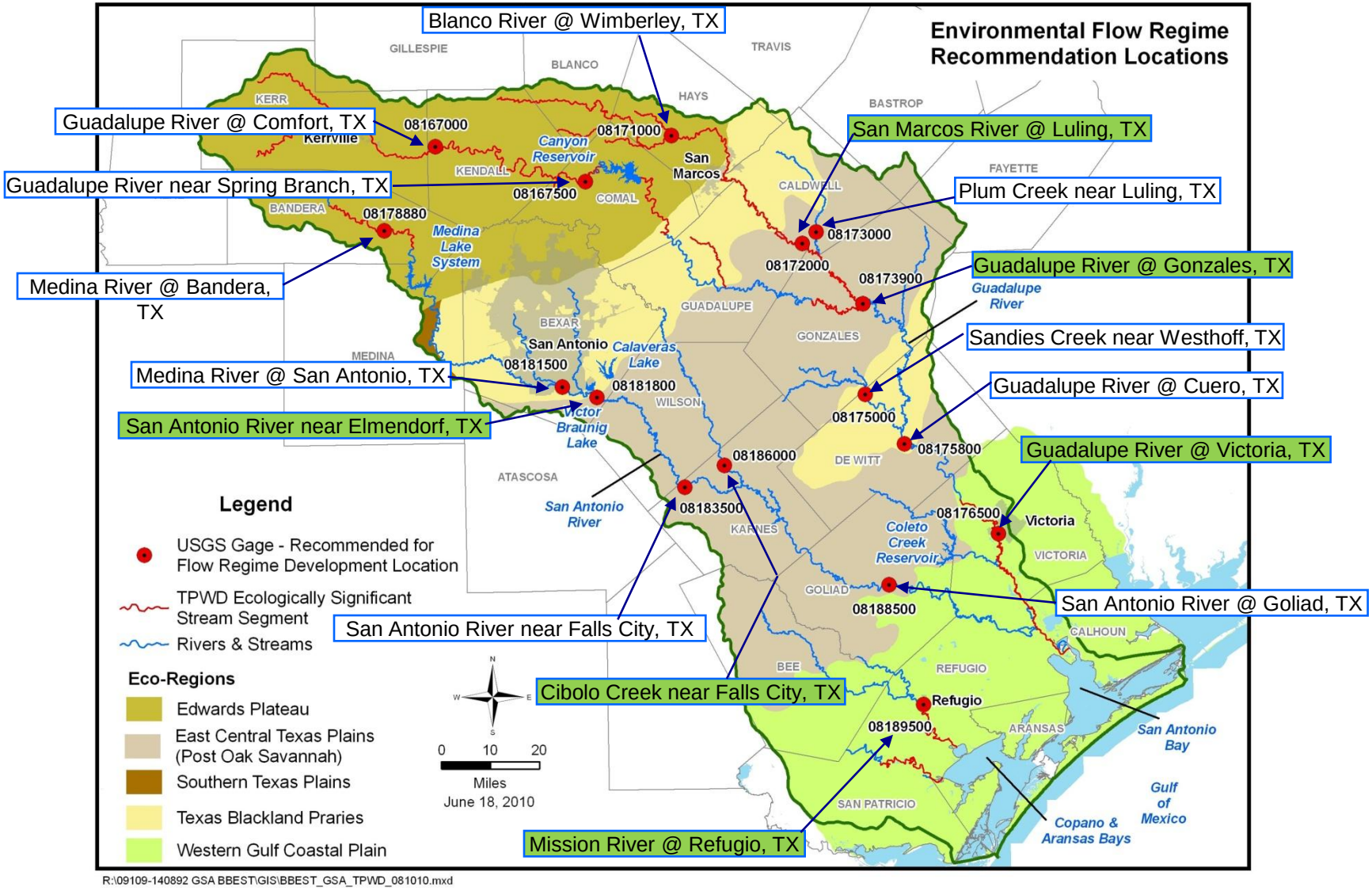
- Costs:
  - Capital Cost = $37,444,000
  - Project Cost = $53,481,000
  - Annual Cost = $7,167,000/yr
  - Unit Cost = $1,421/acft/yr

WMS Summary

	Region L Recommended Water Management Strategy				
	GBRA Mid-Basin (SW) WMS	GBRA New Appropriation (Lower Basin)	GBRA Lower Basin Storage	Storage Above Canyon Reservoir	CRWA Siesta Project
Type Of Project	Off-Channel	Off-Channel	Off-Channel	ASR	R-O-R
River Basin	Guadalupe	Guadalupe	Guadalupe	Guadalupe	San Antonio
Project Firm Yield (acft/yr)*	25,000	11,300	26,400	3,140	5,042
Relies on New Surface Water Right	X	X		X	/
Instream Habitat/Geomorphology Science Available	X				/
Not Dominated by Senior Water Rights	X				X

**Based on Consensus Criteria for Environmental Flow Needs (CCEFN)*

	GSA BBEST Theoretical Projects		Alternative
	Run-Of-River Example @ Cuero	Reservoir Example @ Goliad	Run-Of-River Example @ Goliad or Elmendorf
Type Of Storage	Off-Channel	On-Channel	Off-Channel
River Basin	Guadalupe	San Antonio	San Antonio
Project Firm Yield (acft/yr)	TBD	TBD	TBD
Relies on New Surface Water Right	X	X	X
Instream Habitat/Geomorphology Science Available	X	X	X
Not Dominated by Senior Water Rights	X	X	X


Environmental Flow Regime Recommendation Locations
Blanco River @ Wimberley, TX
Guadalupe River @ Comfort, TX
Guadalupe River near Spring Branch, TX
Medina River @ Bandera, TX
Medina River @ San Antonio, TX
San Antonio River near Elmendorf, TX
San Antonio River near Falls City, TX
Cibolo Creek near Falls City, TX
Mission River @ Refugio, TX
San Marcos River @ Luling, TX
Plum Creek near Luling, TX
Guadalupe River @ Gonzales, TX
Sandies Creek near Westhoff, TX
Guadalupe River @ Cuero, TX
Guadalupe River @ Victoria, TX
San Antonio River @ Goliad, TX
08167000
08171000
08167500
08178880
08173000
08172000
08173900
08181500
08181800
08175000
08175800
08186000
08183500
08176500
08188500
08189500
Kerrville
Canyon Reservoir
San Marcos
Medina Lake System
San Antonio
Calaveras Lake
Victor Braunig Lake
Guadalupe River
San Antonio River
Coleto Creek Reservoir
Victoria
Refugio
San Antonio Bay
Gulf of Mexico
Copano & Aransas Bays
GILLESPIE
BLANCO
TRAVIS
HAYS
KERR
KENDALL
COMAL
BANDERA
MEDINA
BEXAR
GUADALUPE
GONZALES
WILSON
ATASCOSA
KARNES
DE WITT
BASTROP
FAYETTE
CALDWELL
GOLIAD
VICTORIA
CALHOUN
REFUGIO
BEE
ARANSAS
SAN PATRICIO
Legend
USGS Gage - Recommended for Flow Regime Development Location
TPWD Ecologically Significant Stream Segment
Rivers & Streams
Eco-Regions
Edwards Plateau
East Central Texas Plains (Post Oak Savannah)
Southern Texas Plains
Texas Blackland Praries
Western Gulf Coastal Plain
0 10 20
Miles
June 18, 2010
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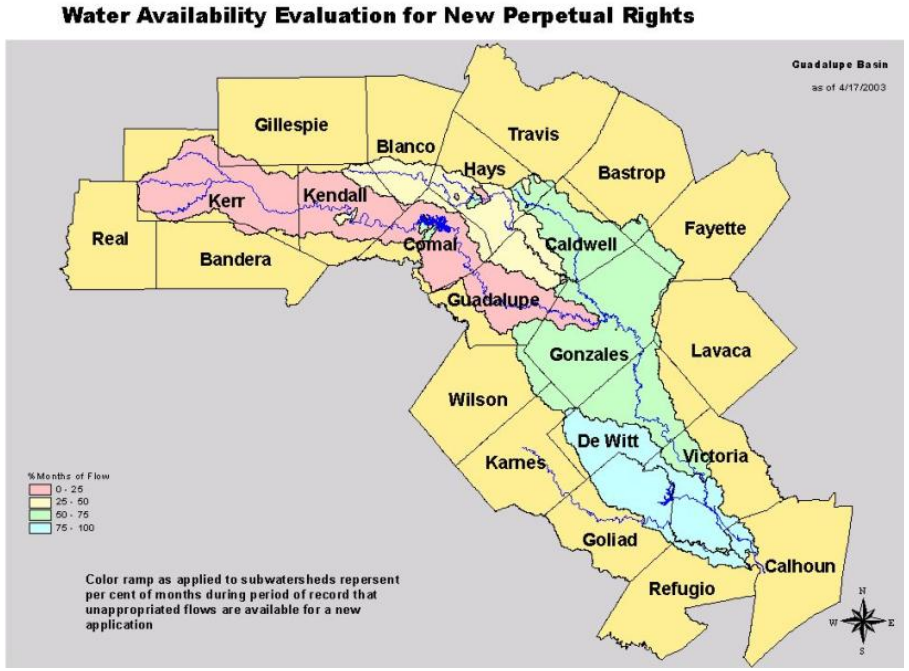
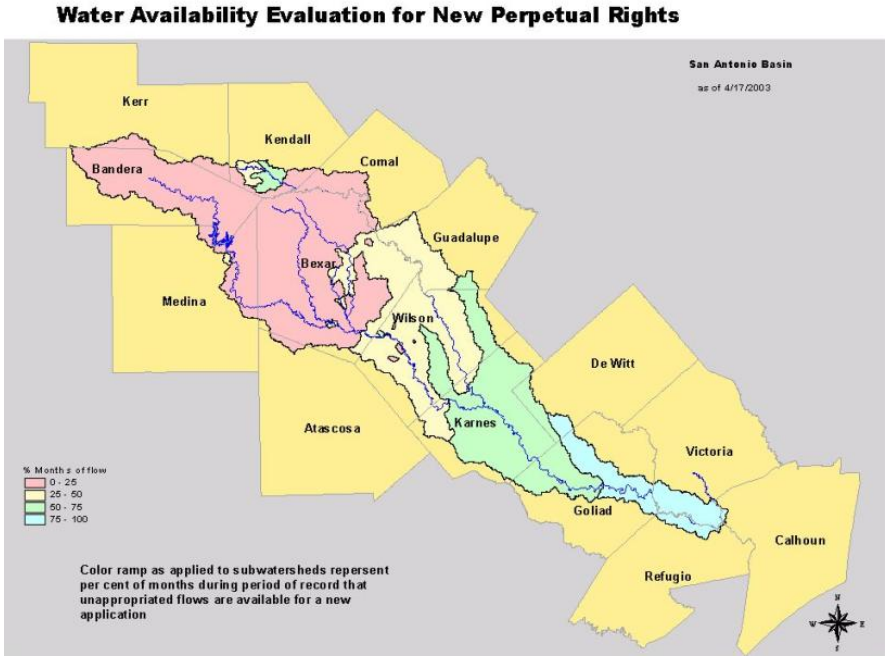
TCEQ Water Availability



Guadalupe River Basin



San Antonio River Basin

Edwards Springflow Options*

GWSIM-4 (1934-1989)

- ***Original WAM Springflow Set (TCEQ)***
  - Outdated CPM Rules, Outdated Edwards Pool Designations
- ***SB3 Springflow Set (Region L)***
  - CPM Consistent with SB3, Full Authorized Withdrawals when available, Minimum Pumpage ~347,000 acft/yr

MODFLOW (1947-2000)

- ***SB3 Springflow Set (EARIP)***
  - CPM Consistent with SB3, Full Authorized Withdrawals when available, Minimum Pumpage ~347,000 acft/yr
- ***Bottom-Up Program (EARIP)***
  - Assumes Minimum Springflows at Comal and San Marcos Springs *if* Facilities are in Place, Full Authorized Withdrawals when available, Minimum Pumpage ~320,000 acft/yr (less suspended irrigation & other dedicated rights)
- ***454k Pumpage (EARIP)***
  - Up to 454,000 acft/yr of Withdrawals when available, CPM consistent with SB3, Minimum Pumpage ~347,000 acft/yr

***Note: Period of Record for GSA WAM is 1934-1989**